Heterogeneity of Gold Nanorods Studied with Two-dimensional Electronic Spectroscopy

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In the last decades, numerous studies have revealed the outstanding properties of gold nanoparticles[1, 2]. They have shown great potentials in biological and biomedical application such as molecular imaging, drug delivery, or photothermal therapy[1]. The main reason for studying gold nanorods (AuNRs), elongated gold nanoparticles, comes from their interesting optical properties, which arise from the surface plasmon resonance (SPR). AuNRs have two main plasmon absorption bands: a transverse SPR band and a longitudinal SPR band (respectively named TrSPR and LgSPR). The first one is located in the visible region, at 510 nm, the second one is also located in the visible region but closer to the infrared region, at 760 nm. However the position of this second band strongly depends on the particles shape and size, can be easily tuned by changing their aspect ratio (the length-to-width ratio), and is also very sensitive to the surrounding local environment[3]. It is also possible to tune the LgSPR bandwidth by controlling the size distribution of the rods[4].

Here we investigate for the first time with a pulse-shaper-based two-dimensional electronic spectroscopy (2D ES) these noble metal nanoparticles in order to determine the heterogeneity of the solution (Fig. 1).

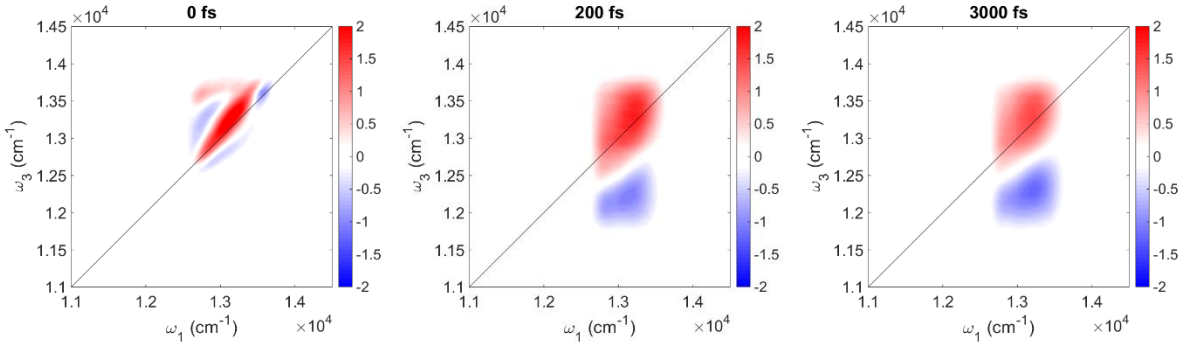

Fig. 1 2DES spectra of AuNR probe a 760 nm at different waiting time.

References

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